



PCE REMEDIATION

Under Former Dry Cleaners Facility

Clients: Fortune 500 Company
Retail Facility
Western Washington
April-August 1999

In February 1999, Current Environmental Solutions (CES) was retained to remediate tetrachloroethylene (PCE) from beneath a former dry cleaners facility. The dry cleaner was in the corner storefront of a busy retail facility in Western Washington. The storefront shared common walls with other active retail businesses (see site map on next page). Just prior to initiating remediation, additional site characterization disclosed that the PCE plume extended beyond the footprint of the dry cleaners and into the adjacent alley. Remediation efforts were immediately expanded to simultaneously treat both the interior and the exterior segments of the plume.

SITE

Site lithology consisted of sands to sandy-silts. An extremely shallow groundwater table was encountered at 2-4 feet below grade (bg) that rose to above the ground during part of the remediation. Initial PCE concentrations were 2,000 ug/kg in soil and 3,600 ug/l in groundwater. PCE Cleanup goals were 500 ug/kg in soil (75.0% removal) and 5 ug/l in groundwater (99.9% removal).

TECHNOLOGY

SPH is emerging as a leading technology in difficult in-situ soil and groundwater remediation. It has proved an efficient, rapid means of remediating soil contaminated by volatile and semi-volatile organic contaminants.

The *in situ* cleanup of DNAPL remains one of the toughest challenges facing the remediation industry. Traditional remediation technologies require years of continued application to produce even marginal results at DNAPL sites.

The technology was developed for the US Department of Energy at Pacific Northwest National Laboratories. CES was the first licensee of this technology, and we are the proprietor of sundry improvements. CES has been a licensee of this technology since 1997. The only other licensee has only had experience in applying these patents since January 2003, giving CES over five (5) years more experience than any other competitor.

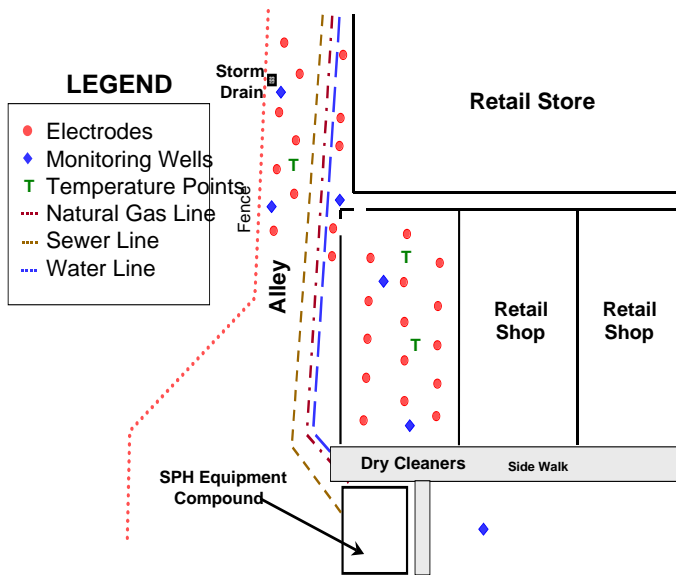
SPH uses polyphase electricity to resistively heat the soil and groundwater to the boiling point of water. This increases the volatility of contaminants, which improves the effects of vacuum extraction. Once steam is generated in situ, it acts as a carrier gas which strips out contaminants from the soil or groundwater. The steam is collected from the subsurface by a soil vapor extraction process, and treated aboveground by conventional means such as activated carbon, and catalytic oxidization.

APPLICATION

Fifteen SPH electrodes were constructed inside the former dry cleaning store and 12 electrodes were installed in the alley. Electrodes extended to a depth of 20 feet bg and were electrically conductive from 12-20 feet bg. The groundwater was cleaned from 2-22 ft bg.

Inside the building the SPH system was installed through the concrete floor slab. Performing SPH in the alley however, represented a challenge. The alley

contained buried utilities for sewer, electrical, water and natural gas. Additionally, it was a fire lane and could not be closed. CES developed a unique electrode design and installation process that allowed the alley to remain open to delivery truck and pedestrian traffic throughout the SPH operation.



Site Layout

The subsurface was heated using a 500kW-power supply. The steam created was collected in 4 horizontal Soil Vapor Extraction (SVE) wells, 2 in the building and 2 in the alley. The condensed steam was clean and could be discharged directly to a sanitary sewer while vapors were treated by activated carbon.

RESULTS

After 75 days of SPH operations, PCE, TCE, and cis-1-2 DCE levels had been lowered below the MCLs in groundwater, both beneath the building and in the alley. The specialized grounding methods and electrode design enabled electrical resistance heating to operate in a public access road and directly adjacent to an operating retail facility.

The electrical heating did not cause danger to the public. The alleyway remained open to the public for the duration of the remediation and the adjacent retail shop was unaffected. There was no damage to the existing utilities.